



WYETH'S DIALYSED IRON.

(FERRUM DIALYSATUM.)

*A NEUTRAL SOLUTION OF OXIDE OF IRON IN
THE COLLOID FORM. THE RESULT OF
ENDOSMOSIS AND DIFFUSION WITH
DISTILLED WATER.*

ABOUT six months ago we placed before the Medical Profession of the United States a new preparation called Dialysed Iron. We did this after long continued and careful experiments as to its manufacture, based upon the published accounts of laboratory work done by Graham, Becquerel, and others, believing that the product so obtained would prove a valuable addition to the then existing list of Chalybeates. We were unwilling to offer it as a remedial agent until the practical working of our appliances enabled us to prepare it on any required scale, and of a uniform quality in every respect equal to the highest standard of the eminent chemists above mentioned. Having accomplished this object, we secured for the new article a trial in hospital and private practice, under the observation of some of the most eminent Physicians of this and other cities. The results of this trial fully justified us in claiming, in our circulars, and in our correspondence with physicians and druggists, many advantages possessed by Dialysed Iron over the ordinary ferruginous preparations.

These advantages are:—

1. It is easily administered, the dose being very small.
2. It has no unpleasant taste or smell.
3. It does not irritate the stomach.
4. It has no effect on the bowels, producing neither constipation nor diarrhoea.
5. It does not blacken the teeth.

Abundant testimony to the reality of these advantages, from unquestionable sources, is appended to this paper, and we beg for a careful examination of it.

Immediately upon the introduction of this article by us, and the recognition so generally accorded to its merits, other manufacturers began offering, to the Drug Trade, preparations, which were called Dialysed Iron, and which were asserted to be equal in every respect

to ours. We confidently maintain, however, that no reliable article of this kind can be made except by the process of dialysis. The digesting of an acid solution until it is neutral will by no means result in a preparation at all identical with our *Dialysed Iron*. We have, at great expense, perfected an apparatus which enables us to produce this article on a large scale. So delicate is the process of manufacture, and so important did we consider the purity of the water used to accomplish the endosmosis, that we bored an artesian well to supply our dialyzers.

We do not assume that there are not many intelligent apothecaries and chemists who can, on a small scale, manufacture Dialysed Iron equal to ours; but we fear that some of the solutions, prepared by saturation, and dialysed only slightly, if at all, may so disappoint physicians as to lead them to condemn, or at least to under-estimate, the genuine article.

We cannot accept the responsibility of the claims put forth for this preparation, except for that manufactured by us. As the process is unavoidably expensive, the article we furnish costs more than the imitations. It is indispensable to a fair trial of this very valuable remedy that the prescriber should specify

“WYETH & BROTHER'S DIALYSED IRON.”

The following brief résumé of the chemistry of the matter will interest those who have not already had their attention particularly directed to it:

The process of dialysis consists in placing the substance in a dialyser, formed of a diaphragm of parchment or membrane, the other side of which is in contact with distilled water. At the end of a certain time the *colloids* remain in the dialyser, while the *crystalloids* have, by endosmosis or diffusion, passed the diaphragm and become dissolved in the distilled water.

In the preparation of Dialysed Iron we avail ourselves of two known principles. The first is connected with the remarkable property possessed by the chlorides in general, of combining with the oxides to form oxychlorides, which are usually soluble, and in which the proportion of oxide is very large. As regards iron, particularly, one equivalent of its perchloride may, under suitable conditions, combine with thirty or more of the oxide, giving a soluble oxychloride, the formula of which would be $\text{Fe}_2 \text{Cl}_3 30 \text{Fe}_2 \text{O}_3$. To get rid of the hydrochloric acid, and obviate the usual inconveniences of ferruginous preparations, we take advantage of the second principle,—that of the unequal diffusibility of hydrochloric acid and peroxide of iron, the latter belonging to the class of colloid bodies; and by means of the dialyser we completely separate this hydrochloric acid, so that, as a final result, we have the thirty equivalents of soluble peroxide of iron contained in a very small volume of water.

When this operation has been conducted with care, the Dialysed Iron thus obtained is an inodorous liquid of a deep-red color; it has none of the styptic taste so common and so disagreeable in ferruginous preparations.

By our appliances we are enabled to carry the dialysation to such a degree that our preparation is tasteless and free from astringent

gency; the minute quantity of the oxychloride not being appreciable, nor giving evidence of existing, unless acid is added, converting it into a salt of iron.

Th. Graham's celebrated essay on the diffusion of liquids, (Phil. "Trans.," 1861, 183) announces the following results: If recently "precipitated ferric hydrate or carbonate of ammonium is added "to an aqueous solution of ferric chloride, as long as the precipitates are redissolved, and if the dark-red solution thus obtained, "containing from 4 to 5 per cent. of solid matter, is subjected to "dialysis, mainly muriatic acid will pass through the septum upon "which, after 19 days, remains a red liquid, containing for 98.5 "parts of oxide 1.5 part of muriatic acid."

Our Dialysed Iron is not a saline compound, and is easily distinguished from Salts of Iron, by not giving rise to a blood-red color on the addition of an Alkaline Sulpho-Cyanide, or a blue precipitate with Ferro-Cyanide of Potassium. It does not become cloudy if boiled. When agitated with one part of Alcohol and two parts of Ether (fortior), the Ether layer is not made yellow.

THE FOLLOWING TESTIMONIALS FROM THE LEADING MEDICAL JOURNALS NOT ONLY GIVE AMPLE EVIDENCE OF THE GREAT VALUE OF THIS PREPARATION OF IRON, BUT FURTHER SHOW THE GENEROUS RECOGNITION AND ENDORSEMENT OF THAT MANUFACTURED BY US, TO THE EXCLUSION OF ALL OTHERS. WE CONFIDENTLY CLAIM A PERFECTION IN APPLIANCES AND APPARATUS THAT ENABLES US TO PRODUCE ON A LARGE COMMERCIAL SCALE AN ARTICLE THAT CANNOT BE EQUALED BY ANY HOUSE IN THIS COUNTRY. OUR DIALYSERS, IN WHICH THE SOLUTION IS SUBJECTED TO THE ACTION OF WATER SUPPLIED FROM AN ARTESIAN WELL, EMBRACE A SURFACE OF SIX HUNDRED SQUARE FEET OF MEMBRANE.

The *Philadelphia Medical Times* for July 21, 1877, contained the following as a leading article:

DIALYSED IRON.

For administration by itself as a pure chalybeate, the new preparation known as Dialysed Iron leaves almost nothing to be desired. It is a clear, neutral, very deep wine-colored liquid, free from taste and apparent astringency, and bearing perfectly dilution with pure water, although water containing salts precipitates with it; our Schuylkill water will sometimes precipitate it. It is undoubtedly a powerful chalybeate. In at least one case we know of, it was well borne after various other preparations of the metal had been abandoned on account of the obstinate constipation they produced.

It has long been known that an aqueous solution of ferric chloride is capable of dissolving the recently precipitated ferric hydrate, and that by evaporation a solid soluble compound or mixture may be obtained. In this way one molecule of the chloride may

readily be made to join with from five to seven of the oxide. There is some difference of opinion as to whether this is a chemical combination or merely a mechanical mixture; but it certainly facilitates writing to speak of the compound as an oxychloride.

Dialysed Iron is made by precipitating ferric chloride with diluted water of ammonia, washing the ferric hydrate which falls, dissolving it in a solution of ferric chloride, and placing the result in a dialyser. Here the iron solution is separated from water by a parchment membrane, and is gradually deprived more or less completely of its chlorine by the passage through the membrane of a chlorinated compound.

It was asserted originally by Graham, the discoverer of Dialysed Iron, that "mainly muriatic acid passes" through the dialyser, and that the iron is left in the form of a soluble colloidal ferric hydrate. This hydrate has, however, never been obtained entirely free from chlorine, and it seems most probable that even in Graham's solution the iron existed as an oxychloride. Further, the solution obtained by Graham was not permanent, gelatinizing with separation of ferric hydrate in about twenty days. The solutions now in the market under the name of Dialysed Iron are permanent, and must contain more chlorine than that of Graham; so that it seems almost certain that the iron is in the form of a very basic oxychloride.

As already stated, Dialysed Iron is precipitated by various salts. With arsenical preparations it acts with great rapidity. Judging from its behavior in the test tube, it is even a better antidote to the poison than is the freshest precipitated oxide. Experiments upon animals are, however, necessary before a final judgment can be reached upon this point.

The London chemists, Messrs. Squire, state that they introduced Dialysed Iron as long ago as 1869; and it has been imported both of French and German origin. Many of these foreign products have been shown to be comparatively worthless, having been either not at all dialysed or very imperfectly so. We are, therefore, very glad that several of our Philadelphia firms have energetically taken the matter in hand. The only sample submitted to us is that of John Wyeth & Brother, which appeared to be all that could be desired. In examining a preparation the possession of the following qualities should be attended to: transparency, precipitation by feeble saline solutions, and freedom from distinct taste and from any acid reaction.

In the same journal, for September 1, DR. GEORGE HAY, of Allegheny City, Pa., writes:

DIALYSED IRON.

Under the heading "Leading Articles" in No. 252 of the *Times* appears an article on Dialysed Iron. Having procured from one of the druggists in this city a sample labelled "Wyeth's Dialysed Iron," I proceeded to examine with the view of determining the quantitative relation between the chlorine and the metal in this preparation. Whether the relation ascertained by me in one in-

stance will always be a constant relation it is impossible for me to tell, and whether the sample was untampered with I cannot say (though it is not likely to have been tampered with), as it was not obtained directly from Messrs. Wyeth & Brother. The sample diluted with distilled water remains a perfectly clear solution. The addition of three volumes of water to a portion of the sample causes no precipitation even after prolonged boiling of the solution. The oxide of iron is completely precipitated by ammonia, as the ordinary hydrate of sesquioxide of iron. Contrary to what might have been expected, I find that the cautious addition of dilute hydrochloric acid to the diluted sample causes precipitation, which is accelerated upon boiling, and at the same time a small portion of the oxide is dissolved as ordinary sesquichloride of iron of a pale-yellow color. This precipitation takes place more quickly with dilute sulphuric acid, and much more slowly with dilute nitric acid. The hydrate which is precipitated by these acids is very much lighter in color than that which falls upon the addition of ammonia, and is probably a different hydrate. After precipitation by hydrochloric acid it requires a pretty large addition of the acid to redissolve the precipitate, and then the solution is only the ordinary chloride of iron, and much lighter in color than formerly, being now of a pale yellow. One cubic centimetre of the solution weighs 15.866 grains, or rather more than the gramme (15.434 grains.) I find that 100 weighed grains of the preparation yield of anhydrous sesquioxide of iron 3.828 grains, and of chlorine only .207 grain. Now, .207 grain of chlorine are equivalent to .316 grain of anhydrous sesquichloride of iron. This last quantity contains .109 grain of metallic iron, which again are equivalent to .155 grain of anhydrous sesquioxide of iron. Deducting .155 from the 3.828 grains of anhydrous sesquioxide already found, there remain 3.673 grains of sesquioxide in solution, without any chlorine or anything else to maintain it so, except water. Probably under the peculiar circumstances the chloride acts as a catalytic body, and by its mere presence keeps the large amount of hydrate of sesquioxide of iron in solution, and probably also the hydrate is not the ordinary hydrate containing three molecules of water; but it is quite possible that during the osmotic process the hydrated sesquichloride of iron containing twelve molecules of water becomes a similar hydrate by substitution, or perhaps is even more highly hydrated and so becomes soluble in water. The disparity between the chlorine and the iron is such that there seems to be little probability that they exist together as a compound, and it would appear very astonishing that so small a quantity of chlorine could hold in solution so large a quantity of iron, especially when the iron exists as hydrate of sesquioxide, and the fact is remembered that, so far as is known, the oxides and chlorides of this metal have always been found to be the analogues of one another. It would require a very great deal of very patient and laborious work to find out how this iron is kept in solution, if, indeed, it could be discovered and explained at all; but the fact remains that this is a very elegant preparation of iron, and that is all which the practical physician requires to know.

From *The Philadelphia Druggist and Chemist*, C. C. VANDERBECK, M. D., Ph. D., Editor:

Messrs. John Wyeth & Brother have from time to time sent me samples of their Dialysed Iron, to which careful trial has been given; and although much testimony has appeared in medical and pharmaceutical journals in regard to the chemistry and therapeutical applications of this article, it may not be amiss for me to add my own results obtained with it.

It can by no means be said that in this very elegant preparation, (to develop which the Messrs. Wyeth have devoted much time, labor, and expense, and which they have taken great pains to submit to Physicians for the purpose of having it thoroughly tested), the efficiency of the remedy has been sacrificed to its beauty. It accomplishes all the objects of the other chalybeates, without the bad effects which they sometimes produce.

In several cases I have used it with gratifying success. In one case in particular, it has been taken in full doses and for a long time, and neither soils the teeth nor constipates the bowels, while its invigorating action is very marked. This therapeutical efficiency is very important, in addition to the negative virtues of the article.

It is clear from the abundant and constantly increasing testimony that Dialysed Iron is no longer an experiment. Its claims have been substantiated both in this country and in Europe. No cases of failure have been reported in which the properly prepared article had been employed.

It is important to bear this in mind, for like all other valuable preparations, this one has been imitated. Wyeth & Brother's Dialysed Iron is somewhat more concentrated even than that made by Bravais, of France, which is the standard accepted in Europe for this article.

Wm. A. Greene, M. D., of Macon, Ga., writes to the *New Orleans Medical and Surgical Journal*, under date June 12, 1877:

"I will mention the case of my wife, who is very delicate, and invariably, if in this climate too late in the heated term, has a bilious attack of some kind, convalescing slowly in an anæmic condition, and only recovering her strength after visiting the chalybeate waters of North Georgia. I have never found a preparation of iron she could bear, on account of its producing unbearable gastric distress. This spring I accidentally was put in possession of a bottle of Dialysed Iron, which I gave her in twenty-drop doses three times daily at meal times. Strange to say, not one unpleasant symptom followed its use, although she was aware that she was taking an *iron* mixture, for which she had a holy horror. With the addition of a bottle of good porter per day and good nourishment, she rapidly improved and recovered without having to leave home to this writing. I feel no hesitancy in pronouncing it *the best* and most valuable preparation of iron in use."

The *Virginia Medical Monthly* for Sept., 1877, has a lengthy article on this subject, from which we quote:

DIALYSED IRON (*Ferrum Dialysatum*) is attracting so much attention throughout the medical world, and its future is so promising, that a notice of it will be of interest to most of our readers. We compile this notice from several paragraphic notes in various medical journals, and from circulars issued by manufacturing chemists, etc.

Dialysed Iron was discovered by John M. Ordway, and was first described by him in *Silliman's Journal* in 1857, although by some Graham is said to be entitled to the credit. Ordway's description was, in the main, confirmed by Béchamp in 1859, (*Annales de Chimie et de Physique*, 3rd series, p. 296); afterwards by Phillips, and again, in 1868, by Jeannel.

The London chemists, Messrs. Squire, state that they introduced Dialysed Iron as long ago as 1869; it has also been imported both of French and German origin. More recently it has been introduced into Austria under the name of *catalytic iron*.

According to a circular recently issued by Messrs. John Wyeth & Bro., manufacturing chemists, &c., of Philadelphia, who have done so much to introduce the article to the American profession, and whose preparation is to be preferred even to the imported, we are informed that in the manufacture of Dialysed Iron we avail ourselves of two known principles. The first is connected with the remarkable property possessed by the chlorides in general, of combining with the oxides to form oxychlorides, which are usually soluble, and in which the proportion of oxide is very large. As regards iron, particularly, one equivalent of its perchloride may under suitable conditions combine with thirty or more of the oxide, giving a soluble oxychloride, the formula of which would be $\text{Fe}_2 \text{Cl}_6 \text{Fe}_2 \text{O}_3$. To get rid of the hydrochloric acid, and obviate the usual inconveniences of ferruginous preparations, we take advantage of the second principle—that of the unequal diffusibility of hydrochloric acid and peroxide of iron, the latter belonging to the class of colloid bodies; and by means of the dialyser we completely separate this hydrochloric acid; so that, as a final result, we have the thirty equivalents of soluble peroxide of iron contained in a very small volume of water.

When this operation has been conducted with care, the Dialysed Iron obtained is simply a neutral concentrated solution of the oxychloride of iron (ferric oxychloride, $\text{Fe}''' \text{Cl}_{23} \text{Fe}''' \text{O}$) holding in combination the higher oxide of iron (ferric oxide or sesquichloride). It does not contain a particle of ferric hydrate, as some have affirmed. Its chemical arrangement is probably best expressed by the formula $\text{Fe}_2 \text{Cl}_6 \cdot 23 \text{Fe}_2''' \text{O}_3$. It should be added, however, that chemists as yet are not fully agreed as to the exact formula. Each fluid ounce of the solution contains twenty-four grains of iron.

Dialysed Iron is a permanent, neutral, inodorous liquid, of a deep red color, but transparent in thin layers. It has none of the styptic taste so common and disagreeable in ferruginous prepa-

rations. Some preparations—especially those of foreign manufacture—contain only $3\frac{1}{2}$ or 4 per cent. of iron, whereas it should contain 5 per cent. A 5 per cent. solution should yield 3 grains of dry residue when 60 grains of it are carefully evaporated to complete dryness. The preparations manufactured in this country are both better in quality and cheaper than the imported. The solution should not be allowed to freeze, as this has the effect of thickening it. But if by evaporation, freezing, or otherwise, it becomes too thick or gelatinous, the addition of a few drops of *distilled* water will bring the solution to the proper consistence; but water containing salts precipitates with it—even the Schuylkill water will sometimes precipitate it. With arsenical salts, Dialysed Iron acts with great rapidity—even more quickly than the freshest preparation of the precipitated oxide of iron which has heretofore been held to be the surest antidote for arsenical poisons introduced into the stomach. Preparations having a sweet taste will very generally be found to be simply the saccharate or glycerate of iron, and entirely different from Dialysed Iron.

Becquerel states that “tested by chemical reagents, this article is found to be immediately precipitated in the form of brown flocculi by a very small quantity of sulphuric acid, by alkalies and by many salts; but it is not precipitated by nitric, acetic, or muriatic acid. This latter property precludes the risk of its activity being interfered with by the chlorides in the digestive canal.”

Dialysed Iron is distinguished from the salts of iron by not giving rise to a blood red color on the addition of an alkaline sulpho-cyanide, nor to a blue precipitate with ferro-cyanide of potassium. It should not become cloudy if boiled. When agitated with one part of alcohol and two parts of the stronger ether, the ether layer should not be made yellow.

Dialysed Iron may be administered for months together for all the purposes for which ferruginous preparations are usually exhibited. Becquerel says of it—and his observations are confirmed by physicians of eminence everywhere—that “it produces neither heartburn, diarrhoea, constipation, eructations, nor, in short, any gastric disturbance; and, which is a matter of much importance, it *never blackens the teeth*.” It is especially in anæmia, chlorosis, palpitations, chronic diarrhoea, gastralgia, dysmenorrhœa, etc., etc., that its use is indicated. It is certainly tolerated well by some persons who do not bear other forms of iron. Dr. S. Weir Mitchell, in a recent clinical lecture reported in the *Medical and Surgical Reporter*, especially recommended it in a case of extreme exhaustion coming on in a professional pedestrian two weeks after a walking feat of fifty miles in ten hours.

But its *specific* virtue is as an antidote for poisoning by arsenic. Dr. H. C. Wood, in the *Medical Times*, July 21, 1877, as already quoted, says, “Judging from its behavior in the test tube, it is even a better antidote to the poison than is the freshest precipitated oxide. Experiments upon animals are, however, necessary before a final judgment can be reached upon this point.” When Dialysed Iron is taken into the stomach, gelatinous ferric hydrate

is produced. It also possesses the great advantage of being always ready for immediate use, and, possessing the virtues of iron in general, will hereafter be found in every drug-store and in the saddle-bags of every country physician.

The dose of Dialysed Iron, for tonic purposes, is from five to twenty drops four or five times daily. It may be taken, however, without inconvenience in doses several times larger than those stated, but to no advantage, as only a certain amount can be absorbed into the system. From numerous experiments recently made, it would appear that this amount is not more than from fifty to eighty drops per day. Dr. S. Weir Mitchell, however (*loc. cit.*), uses it "in far larger doses, and has given it freely by the drachm or the half ounce [per day] without its causing annoyance." Of course, in cases of arsenical poisoning, an excessive dose should be given at once.

Dialysed Iron is best administered by itself upon sugar, or mixed with some simple syrup which is free from an acid, as an acid admixture converts the preparation into a salt of iron. It may also be conveniently given in wine, or in coffee, etc. Being, however, without odor, and imparting merely the faintest astringent taste—if not altogether tasteless—to the palate, and being compatible with syrup and alcohol, and communicating no taste to any suitable vehicle, it is easy to construct formulæ for elixirs, syrups, etc. A glycerite of Dialysed Iron is said to be an elegant preparation.

The manufacturers in this country furnish with each bottle a "drop counter," which greatly facilitates the administration of the solution. This consists of a small glass tube, nozzle-pointed, capped by a rubber bulb. "The rubber portion is compressed with the fingers, and the tube is introduced into the liquid; the pressure is then relaxed, when the liquid passes up into the instrument, which is thus charged, and may be removed. By repeated gentle pressure on the rubber, the liquid is made to issue, drop by drop, until the requisite number is counted." The instrument should not be washed with ordinary water, for reasons already stated, but should be cleaned, after using, with a clean rag of soft linen.

Prof. John M. Maisch, of Philadelphia, writes as follows in the *American Journal of Pharmacy* for July, 1877.

As to the advantage of the dialysed over the oxychloride made by saturation with hydrate of iron, that is best ascertained by comparing their taste, which in the former is scarcely astringent, while that of the latter is distinctly ferruginous. A preparation now before me, imported from Germany, called *Ferrum oxydatum dialysatum*, I do not hesitate to say has been made by saturation alone, or by incomplete dialysis; for its reaction is distinctly acid and its taste quite styptic. Some French preparations, sold by the same name, were found to be superior to the German in both respects; but one yielded only 3.3 per cent. of solid matter, another less than half that quantity. A 5 per cent. solution of Dialysed Iron should yield 3 grains of dry residue when 60 grains of it are carefully evaporated to complete dryness.

The characteristics of a 5 per cent. solution of Dialysed Iron may be stated to be—

1. The deep brown-red color, which in thin layers is perfectly transparent.
2. The freedom from odor and taste, it being merely faintly astringent to the palate.
3. The absence of even slight acid reaction to test-paper; and
4. The behavior to tannin and to saline solutions (even spring water), as stated above.

It is best given by itself upon sugar, or mixed with some simple syrup which is free from acid. It should be mentioned that the same preparation has made its appearance in Austria as *catalytic iron*.

Dr. L. P. YANDELL, JR., Prof. of Therapeutics and Clinical Medicine in the University of Louisville, says in the *Louisville Medical News* :

Dialysed Iron has been used to a limited extent for some years in Europe, but it is only within the past few months that it has attracted much attention in America. It is now manufactured on a large scale by Wyeth & Brother, of Philadelphia, and according to the highest authorities in pharmacy this American preparation is greatly superior to the foreign article.

For more than a month I have employed Dialysed Iron in my practice to the exclusion of all other forms of the metal, and with most gratifying results. The manufacturers claim for Dialysed Iron the following advantages: It is tasteless, does not blacken the teeth, does not produce headache, gastric derangement, or constipation, and acts as efficaciously in ten drop doses given four or five times a day as in double or quadruple these quantities. Besides, it is asserted to be equally as reliable an antidote to arsenic as the hydrated sesquioxide. In color it is a bright, reddish brown. Taken undiluted it has the faintest possible styptic taste, but this is not observable when water is added. It is possessed of a slight, peculiar flavor, resembling that of fresh blood, but not in the least unpleasant. In cold weather it is said to become thick—gelatiniform, and that a few drops of impure water to a considerable quantity of the fluid may produce this result at any time. This coagulation I have noticed even with the thermometer ranging between 80° and 90°; but a small quantity of distilled water added immediately restores its liquidity.

In anæmia, from various causes, in the neuroses, dermatoses, menstrual derangements, phthisis, syphilis, sexual debility, and indeed in all of the morbid conditions for which I have prescribed *ferrum dialysatum* it has given perfect satisfaction, except in two cases, where it produced some constipation; but in both these instances it was administered in what the manufacturers state are unnecessarily large doses. In one, a lady, half tea-spoonful was given thrice daily, and in the other, a girl of six years, fifteen drops were given thrice daily. In many others, half-tea-spoonful doses given three to six times in the twenty-four hours led to no

unpleasant results. In restoring the appetite, and in building up strength this form of iron has seemed to surpass all others. Already Messrs. Wyeth's new preparation has become popular with those who have used it, and when its excellencies have become generally known, it is safe to predict that it will supersede nearly all of the other ferruginous preparations.

Anstie insisted on the necessity of iron in the treatment of the neuroses, and what he claimed for iron in this class of maladies is equally true of other diseases. Iron deserves to rank as the king of metals in medicine, as it does in the arts and manufactures.

Dialysed Iron may be given in any vehicle desired—syrups, elixirs, tinctures, or glycerites, but simple water is most likely to be preferred by the sick, as in this way it is without taste, and sick people usually dislike flavors.

Many formulæ are suggested in the pharmaceutical journals for the manufacture of Dialysed Iron, but with its mode of production, the physician is not concerned. Suffice it to say, that this addition to the materia medica is made from the liquor of the perchloride of iron, and the dialysis is performed by percolation through parchment, bladder, or fine parchment paper, after the components of the medicine have been properly commingled.

The *Louisville Medical Journal*, (July 21, 1877), says:

One of the latest pharmaceutical novelties is the preparation bearing the above name. It was considered for a long time that he, who added another ferric compound to the already overburdened list in the pharmacopœia, was far from being a benefactor; but Dialysed Iron will win welcome for itself and thanks for its invention. Dialysed Iron is a pure peroxide of iron in a liquid state. It has none of the styptic taste common to ferruginous preparations. It is neutral in its reaction, easily absorbed, and is unirritating. It does not blacken the teeth. "It produces neither heartburn, diarrhœa, constipation, eructations, nor any gastric disturbance," is the testimony of Becquerel. And to all these good qualities, it is an antidote for arsenic quite as efficient as the hydrated sesquioxide, and has the great advantage of being always ready for use.

Concerning the therapeutic qualities of Dialysed Iron, the following testimony from Dr. S. Weir Mitchell, extracted from an account of his clinic in the Philadelphia Medical and Surgical Reporter of July 7, is of particular value. His patient was one suffering from nervous exhaustion. He said:

"As to drugs, I shall give him only iron, and not the subcarbonate of the U. S. Pharmacopœia which we usually employ, but the Dialysed Iron, a neutral solution of the peroxide, with which I have been experimenting largely of late. It is commonly given in doses of thirty or forty drops a day, which would be a small dose, as the solution contains twenty-four grains to the ounce. I use it, however, as I use most iron preparations, in far larger doses, and have given it freely by the drachm or the half ounce without its causing annoyance. The preparation is certainly

tolerated well by some people who do not bear other forms of iron; and as it does not blacken the teeth or in any way affect the bowels, I have been altogether pleased with it. Its freedom from unpleasant taste is also no mean advantage. The foreign forms of Dialysed Iron are sometimes objectionable, both on account of their price, their taste, and the uncertainty of their quality. These objections do not apply to the admirable specimens of the drug as it is now made, upon a large scale, by John Wyeth & Brother, of this city."

The *Boston Journal of Chemistry*, (October, 1877), speaks thus of WYETH & BROTHER'S Dialysed Iron:

We would call the special attention of the profession to Dialysed Iron. It has been long known to the experimental chemists, but until lately has not been manufactured in sufficient quantity to make it a commercial product. By the method employed by Wyeth & Bro., a dark-brown liquid, having little styptic taste, is made. This, in connection with the fact that it does not blacken the teeth nor disturb the alimentary canal, will recommend it above ordinary preparations of iron. It cannot, however, be given in composition with any other drug, as it is liable to precipitation, the addition of a few drops of undistilled water clouding the solution. In all cases where the use of iron is indicated, this will be found to be the most agreeable mode of prescription. It is a pure hydrate, and as efficient as the sesquioxide, in all cases of poisoning, when the latter is useful, besides having the additional advantage of being always ready for use.

This receives the endorsement of quotation in the *Ohio Medical Recorder*, for August, 1877. The editor adds:

We have, ourself, used this preparation of iron, *exclusively*, for the past two months, and with the very best results in every respect. Possessed, apparently, of all the tonic properties of the old tincture, its use is attended with no constipation, no discoloration, no irritation, *no objections*.

The *Canada Journal of Medical Science*, speaks of Wyeth's Dialysed Iron as "a very valuable addition to the *Materia Medica*."

The *Pacific Medical and Surgical Journal*, for Sept., 1877, says:

"It is our impression that the dialysed preparation of iron ought to supersede, and that it will soon supersede several other preparations, and particularly the tincture of the chloride, in

common use. Dr. S. Weir Mitchell, who cannot be suspected of puffery, refers to it in a clinical lecture," etc., the quotation given being the same elsewhere found in these pages.

From the *Oil, Paint and Drug Reporter*, edited by N. C. WHITE :
Drug, Chemical and Pharmaceutical Notes :

DIALYSED IRON.

This preparation has attracted the attention of many of the pharmacists and medical profession of Europe for some time past, and the experience resulting from its use is so satisfactory, peculiar, and wonderful, that it is probably destined soon to become one of our most valued therapeutic agents, in a large class of diseases where the ordinary iron preparations are objectionable. "With this preparation," says an author, "we are able now to avoid all inconveniences which arise from the employment of ordinary ferruginous preparations."

Our attention was called to it some months ago through correspondence with a customer residing abroad, who spoke so highly of it, and mentioned such peculiar and wonderful properties it possessed, that led us to inquire more particularly into it. Further correspondence stated that this party had taken it as a remedial agent for a protracted period without the least inconvenience or unpleasant effect, and while under treatment in this country for the same ailment, the ordinary iron preparations were prescribed, but could not be taken for any considerable time without experiencing the common trouble so frequently complained of—head-ache, constipation, etc.

The following case, reported in the *Philadelphia Medical Times*, for December 8, by Dr. THOMAS B. REED, a distinguished practitioner of this city, strikingly illustrates the value of Dialysed Iron as an antidote in cases of arsenical poisoning :

Philadelphia, November 15, 1877.

A case of Arsenical Poisoning treated with Dialysed Iron. THOS. B. REED, M. D.

A case of Arsenical poisoning occurred lately in my private practice, which seems to be valuable enough for publication, both on account of the completeness of the details, and the intelligence and reliability of the patient; but especially as it is, so far as I am aware, the first case where the new remedy of "Dialysed Iron" has been put to the test as an antidote.

As I was leaving my office one morning, a few weeks ago, a young lady patient, Miss S., hastily entered, with a face indicative of intense pain and nervous disturbance, saying, "Doctor, I am poi-

soned." Her story was as follows:—While attending to the wants of a valuable servant who was sick and confined to her bed, Miss S. found hidden away in the servant's trunk, a paper of Arsenious Acid, which had been procured by Mrs. S. some weeks before, for use as a poison for rats. As this servant had been in ill health for some time, and morbid and melancholy, Miss S. at once very naturally, and no doubt very rightly supposed, that she had secreted the poison for the purpose of taking her own life. Quietly placing the packet of Arsenic (which was open) in her pocket, she continued her duties, intending at the earliest moment to put it in a safe place. Days elapsed, the arsenic was forgotten, stored away in the pocket of her wrapper until this unlucky morning, when putting a couple of handfuls of gum drops and bon-bons into her *arsenic pocket*, she sat down to her sewing machine and her confectionery. She noticed from time to time as she sewed, more powder upon the drops than seemed usual, but she continued quietly to dust them off as she eat and went on with her work. *Can anything be more absurdly tragic than this unconscious suicide, deliberately eating gum drops powdered with arsenic?* Probably an hour and a half passed in this innocent amusement, when suddenly "becoming deathly sick, instantly followed by intense pain," as if, as she quaintly expressed it, "she had had a pure mustard plaster on the inside of her stomach," she was roused to the consciousness that some strange mischief was at work. Terrified on remembering the arsenic, she attempted, unsuccessfully, to relieve her stomach with warm water, then, unwilling to alarm her mother, who was also an invalid, she hastily threw on her street dress and hat and hurried to my office, about two blocks away. Fortunately for both of us, I had upon my table a sample bottle of Dialysed Iron, (John Wyeth & Bro.) and as soon as she told me she had taken arsenic, and before she began her story, I administered a half tablespoonful of the Iron well diluted in a tumbler of water. This gave her almost instant relief. I repeated the dose in ten minutes, and then gave her a bottle of the Iron, directing her to take a similar dose every half hour, and later, every hour during the day. I saw her at her home in a few hours after, but she had had no return of her pain, except some slight cramp in the lower bowel and limbs; and a dose of magnesia at night, with mucilaginous drinks, soft food, with occasional doses of the Iron well diluted, kept up for a few days, completed her cure. At my request the day after her attack, Miss S. put into my hands the pocket cut from the wrapper, which she could not be persuaded to touch after her poisoning. This I transferred to a reliable analytical chemist, from whose report of his examination, now in my possession, I condense the following:—"In the pocket of a chintz dress I found a small packet labeled Arsenic—Poison,—and in this packet a second envelope, open on its long and upper side, containing a white powder. Both outer and inner envelopes were worn, as letters carried in pockets are. Between the outer and inner envelopes, was a white powder, and in the pocket itself, mixed with the powder, I found two (2) sugar crystallized, soft gum drops, and one (1) sugar coated bon-bon, all three (3) richly covered with the powder. The powder, which with a brush I took away from the gum drops, and the dragée, weighed $3\frac{1}{2}$ grains, and the remaining powder, after separating the gum and sugar, weighed $2\frac{1}{16}$ grains.

In the pocket I found also, $65\frac{5}{8}$ grains of the white powder. The powder obtained from the gum drops and dragée gave all the tests Arsenious Acid gives."

What amount of arsenious acid my patient swallowed, it is of course impossible to say. It is certain, that, from this open package of arsenic, a considerable quantity escaped into the pocket, and the gum drops were mixed with it, as she states "that she had to dust the powder off upon her work as she eat," and the three remaining after, show $2\frac{1}{8}$ grains of arsenious acid upon them, on examination by the chemist. I have perhaps been unnecessarily full in the details of this case, but I think they have established several facts; 1st, That my patient did swallow in the space of an hour or more, *numerous poisonous doses* of arsenious acid in powder. 2nd, That I found her with most marked symptoms of arsenical poisoning; and 3d, That by the administration of moderate doses of "Dialysed Iron," well diluted, I was enabled to give her immediate and certain relief, and ultimate and entire restoration to health. I do not propose in the limits of this paper to discuss the exact chemistry of the "Dialysed Iron." It is, I believe, (when properly prepared, as I have since investigated carefully the process of its formation,) a solution of per-oxide of Iron in the colloid form, with perhaps a trace of hydrochloric acid; but that it will, when very largely diluted with water, perfectly coagulate arsenious acid *in solution*, any one can satisfy himself in a five minutes test. The only remaining point of interest professionally is, will it neutralize arsenious acid when taken *in powder (bulk)* into the stomach? It is held by most authorities I believe, that when arsenious acid is taken in bulk into the stomach, the Iron antidote is not reliable. (See Dunglison, R. J., (latest paper on the subject,) in his "Practitioner's Reference Book," page 229). Yet we know from daily experience that arsenious acid is absorbed by the stomach when taken in minute doses, and I think the evidence in this case shows that arsenic in powder did poison, when presented to and acted upon by a comparatively empty stomach, (at least three hours having elapsed since her breakfast,) and that the solution of per-oxide of Iron, ("Dialysed Iron,") did prove a prompt and reliable antidote, coagulating and neutralizing the arsenic. Arsenious acid *acts as it is dissolved*, and the antidote, (if supplied,) combines, *pari passu*, with the solution formed by the liquids of the stomach, and renders it inert, before damage is done to the mucous coat of the stomach, or it is absorbed into the system. Within twenty seconds after I learned that arsenic had been swallowed, I sent a full dose of the antidote after the poison, and with positive and immediate relief to the patient. My experience with "Dialysed Iron" as a pleasant and efficient means of introducing Iron into the economy, is too limited for an opinion; but I feel disposed, from the history of this case, to strongly recommend it as a safe, reliable and always-ready-at-a-moment's-notice, remedy and antidote for arsenical poisoning.

1427 Walnut Street.

Dr. S. Weir Mitchell having used our Dialysed Iron more largely than any other physician, previous to our bringing it to the general attention of the medical profession, we asked him to be kind enough to advise us if its continued use confirmed his first favorable opinion as expressed in his clinical lecture referred to in another portion of this paper. He sends us the following gratifying reply:—

1524 *Walnut Street, Philadelphia.*

TO WYETH & BROTHER.

Gentlemen:

I am glad to be able to say that now after much more prolonged use of your Dialysed Iron, I have more and more reason to be pleased with it. As I use the solution in drachm doses, I have had a fair chance of testing its power to disturb the patient's functions. So far, however, even in these large doses, it does not seem to constipate, nor to affect injuriously the process of digestion.

Yours truly,

WEIR MITCHELL.

DR. JOHN H. PACKARD used Wyeth's Dialysed Iron in a number of cases while we were experimenting with it. He writes us the following note:—

“An extended trial of the Dialysed Iron prepared by Messrs. John Wyeth & Brother has convinced me that it is a most valuable addition to the *Materia Medica*, and likely to supersede in great degree, the chalybeates heretofore employed.

The results obtained from it under my observation, have been such as fully to justify the strong claims of the manufacturers in its behalf.”

JOHN H. PACKARD.

1924 Spruce St., Philada., Nov. 7, 1877.

